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New *Bacidia, Opegrapha,* and *Rhizocarpon* records for Turkey and Asia

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Abstract — *Bacidia herbarum, Opegrapha dolomitica, Opegrapha saxigena*, and *Rhizocarpon ridescens* are newly recorded from Turkey. *Opegrapha dolomitica* and *O. saxigena* also represent new lichen records for Asia. Brief descriptions are provided for each species.

Key words—flora, Black Sea, Giresun

Introduction

In the last five years, lichenological investigations in Turkey have produced many new lichen records for the country (e.g. Öztürk & Güvenç 2010, Oran & Öztürk 2010, Arslan et al. 2011, Karagöz et al. 2011, Kınalıoğlu & Aptroot 2011, Şenkardeşler & Calba 2011, Vondrák et al. 2012, Aslan & Yazıcı 2013, Çobanoğlu et al. 2013, Yazıcı et al. 2013, Halıcı et al. 2014, Kocakaya et al. 2014). Despite the increase in the number of lichens recorded, additional study is needed in some regions where the lichen flora remains poorly known. Here we provide four additional lichen records for the Turkish lichen biota.

Materials & methods

The study material was collected during lichen-collecting excursions in the region Giresun in the north of Turkey. Specimens were deposited in the herbarium of the Biology Department, Faculty of Science and Arts, Giresun University, Giresun, Turkey (GUB). The collections were identified following routine microscopical techniques. Water, 10% potassium hydroxide (KOH), and Lugol's iodine (I) were used as mountants

for hand-cut anatomical sections that were examined under the light microscope. Ascospores were measured in water and KOH at 400× magnification.

Taxonomy

Bacidia herbarum (Stizenb.) Arnold, Flora 48: 596. 1865.

Thallus muscicolous, whitish grey, thin. Apothecia dark brown-black, scattered, 0.4–1 mm diam. Hymenium 45–55 µm tall, epihymenium fawn, hypothecium with upper part pale brownish-reddish. Ascospores 3–7- septate, 30–50 × 2–2.5 µm. Pycnidia absent. Thallus C–, K–, KC–, PD–.

Specimen examined: **TURKEY. Giresun**: Şebinkarahisar, N of Asarcık village, 40°25′11″N 38°23′33″E, 1856 m, on mosses, 26 Oct. 2014, leg. K.Kınalıoğlu (GUB 2378).

Remarks—For detailed descriptions of the species see Thomson (1997), Smith et al. (2009), and Dobson (2011). *Bacidia herbarum* is a rare boreal circumpolar species, growing on mosses, on calcareous turf in grassland or amongst limestone rocks, and on small perennial plants or plant debris, from sea level to 800 m (Thomson 1997, Smith et al. 2009, Dobson 2011). In Turkey, it has been collected only on mosses at high elevation.

Known from Asia, Europe, and North America (Thomson 1997, Smith et al. 2009); this is the first record of *B. herbarum* for Turkey.

Bacidia herbarum is similar to *B. bagliettoana,* which has black apothecia with a green epihymenium (Smith et al. 2009). The sizes of the apothecia, ascospores, and hymenium in the Turkish specimen are smaller than the sizes given by Thomson (1997; apothecia 0.4–1.5 mm diam, ascospores 30–60 × 1.5–3 µm, hymenium 55–60 µm), Smith et al. (2009; apothecia 0.3–0.7 mm. diam., ascospores 36–60 × 2–2.5 µm, hymenium 45–60 µm), and Dobson (2011; apothecia ≤0.7 mm diam., ascospores 30–50 × 2–3 µm, hymenium 45–60 µm). The Turkish collection also differs ecologically by growing on siliceous rock.

Opegrapha dolomitica (Arnold) Clauzade & Cl. Roux ex Torrente & Egea, Biblioth. Lichenol. 32: 146. 1989.

Thallus saxicolous, thin or immersed, cream. Apothecia black, scattered, 0.4–1.5 × 0.25–0.7 mm diam. Hymenium 90–120 µm tall, epihymenium pale brownish. Ascospores hyaline, 3-septate, 16–24 × 5–7µm, clavate, with a thin perispore. Thallus C–, K–, KC–, PD–, UV–.

Specimen examined: **TURKEY. Giresun**: Keşap, Değirmenağzı village, sea shore, 40°58′23″N 38°37′29″E, 2 m, on siliceous rock, 19 May 2015, leg. K.Kınalıoğlu (GUB 2379).

Remarks—For detailed descriptions of the species see Smith et al. (2009) and Dobson (2011). *Opegrapha dolomitica* is found on sheltered moist limestone or calcareous schists, the side of flints in limestone pavement, mortar, or

associated base-rich siliceous rock (Smith et al. 2009, Dobson 2011). In Turkey, we recorded it only from coastal siliceous rocks on the Black Sea shore.

Known from Europe (Smith et al. 2009); this is the first record of the species for Turkey and Asia.

Opegrapha dolomitica differs from *O. calcarea* by the K–, brown pigmentation of the apothecial tissues, longer ascospores, and the usually longitudinally furrowed or gnarled-subgyrose shape of the apothecium (Smith et al. 2009). The Turkish material of *O. dolomitica* differs from European specimens by having smaller apothecia and ascospores. In European collections, the apothecia are 0.5–3 × 0.16–0.35 mm, and the ascospores are 20–31 × 5-8 µm (Smith et al. 2009). The Turkish collection differs ecologically in occurring on siliceous rock at a coastal locality.

Opegrapha saxigena Taylor, Ann. Mag. Nat. Hist., Ser. 2, 13: 93. 1854.

Thallus saxicolous, thin, superficial, brownish or purplish-brown. Apothecia black, 0.5–1.1 × 0.18–0.4 mm diam. Hymenium 80–120 µm tall, epihymenium brown. Ascospores hyaline, 3-septate, 16.5–21 × 4–5 µm, narrowly ellipsoid or rarely lightly clavate. Thallus C–, K–, KC–, PD–, UV–.

Specimen examined: **TURKEY. Giresun**: SW of centre, Boztekke village, 40°55′05″N 38°18′31″E, 8 m, on siliceous rock, 10 Apr. 2010, leg. K.Kınalıoğlu (GUB 2380).

Remarks—For detailed descriptions of the species see Smith et al. (2009) and Dobson (2011). Elsewhere in its range *O. saxigena* grows on deeply shaded siliceous rock, particularly in old woodlands, rarely on smooth bark (e.g., *Ilex*), often forming extensive communities with *O. gyrocarpa* and *O. zonata* and locally frequent (Smith et al. 2009, Dobson 2011). In Turkey, our sample was collected from siliceous rock in partly shaded and damp hazelnut gardens. In accordance with the literature, our sample grew together with *O. zonata*.

Known from western Europe (Smith et al. 2009), this is the first record of *O. saxigena* for Turkey and Asia.

Opegrapha saxigena differs from *O. gyrocarpa* and *O. zonata* by the absence of soralia and the lack of lichen products (Smith et al. 2009). The apothecia and ascospores in the Turkish collection are almost the same size as given by Smith et al. (2009; apothecia 0.5–1.4 × 0.15–0.45 mm. diam, ascospores 15–22 × 4–6 µm) and Dobson (2011; apothecia ≤1 mm diam, ascospores 15–20 × 4–5 µm).

Rhizocarpon ridescens (Nyl.) Zahlbr., Nat. Pflanzenfam. 1(1*): 138. 1905.

Thallus saxicolous, areolate, areoles to 1.2 mm diam, roundish, strongly convex, dispersed, pale greenish-yellow, with granular soralia; prothallus black, medulla I+ blue. Apothecia absent. Medulla K–, PD+ yellow

Specimen examined: **TURKEY. Giresun**: Şebinkarahisar, between Asarcık village and Saplıca village, stream bank, 40°24′13″N 38°25′09″E, 1504 m, on iron-bearing siliceous rock, 26 Oct. 2014, leg. K.Kınalıoğlu (GUB 2381).

Remarks—For a detailed description of the species see Smith et al. (2009). *Rhizocarpon ridescens* grows on metal-rich siliceous rocks in montane to alpine localities (Wirth 1995) and is also reported from a south-facing metal-rich vertical siliceous crag at an elevation of 430 m in Scotland (Smith et al. (2009). In Turkey, *Rhizocarpon ridescens* was found on iron-bearing siliceous rock on a stream bank at an altitude of 1504 m, accompanied by *Rhizocarpon lecanorinum*, *Lecidea silacea*, and *Rhizocarpon oederi*.

Known from central Asia and Europe (Smith et al. 2009), this is the first record of the species for Turkey.

Rhizocarpon ridescens is distinguished from the other yellow *Rhizocarpon* species in having soredia, although some *Lecanora* species can be similar and the brown *R. furfurosum* has blastidia (Smith et al. 2009). The size of the areoles in the Turkish material is slightly larger than the size previously reported by Smith et al. (2009; soralia ≤1 mm diam.).

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